




Jeongbhin Seo, Ph.D.




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🌐 <https://jeongbhin.github.io/>





Employment History

- 2024.10 - - - - -  **Chick Keller Fellow**, Los Alamos National Laboratory, Theoretical Division
Advisor: Dr. Fan Guo, Dr. Hui Li
- 2023.12 - - 2024.9  **Postdoctoral Researcher**, Los Alamos National Laboratory, Theoretical Division
Advisor: Dr. Fan Guo, Dr. Hui Li
- 2022.9 - - 2023.11  **Postdoctoral Researcher**, Department of Physics, Ulsan National Institute of Science & Technology.
Advisor: Prof. Dongsu Ryu

Education



- 2018.09 - - 2022.08  **Ph.D., Pusan National University** Earth Science.
Advisor: Prof. Hyesung Kang
Degree date: 08/26/2022
Thesis title: *A Simulation Study of Ultra-relativistic Jets*.
- 2015.03 - - 2018.02  **M.Sc., Pusan National University** Earth Science.
Advisor: Prof. Hyesung Kang
Degree date: 02/23/2018
Thesis title: *The Contribution of Stellar Winds to Cosmic Ray Production*.
- 2008.03 - - 2012.02  **B.Ed., Pusan National University** Earth Science Education.
Degree date: 02/17/2012










Awards and Fellowships

- 2024  **LANL SPOT Award**, Los Alamos National Laboratory
- 2024-2027  **Chick Keller Fellow**, Los Alamos National Laboratory
- 2021  **Busan Future Scientist Award**, Federation of Busan Science and Technology
- 2020-2022  **NRF Ph.D. Fellow**, The National Research Foundation of Korea

Research Publications





PEER REVIEWED PAPERS


- 1 F. Guo, O. French, Q. Zhang, X. Li, and **J. Seo**, "Particle Injection Problem in Magnetic Reconnection and Turbulence," *Submitted in ApJ*, arXiv:2506.19938, arXiv:2506.19938, Jun. 2025.  DOI: 10.48550/arXiv.2506.19938. arXiv: 2506.19938 [physics.plasm-ph].
- 2 **J. Seo**, F. Guo, X. Li, B. Chen, C. Shen, and H. Li, "Energetic Nonthermal Electrons within the Above-the-looptop Regions in Solar Flares: Acceleration, Feedback, and Quasi-Periodic Pulsations," *Submitted in ApJ*, Apr. 2025.
- 3 **J. Seo**, D. Ryu, and H. Kang, "Energy spectrum and mass composition of ultra-high-energy cosmic rays originating from relativistic jets of nearby radio galaxies," *The Astrophysical Journal*, vol. 988, no. 2, p. 194, Jul. 2025.  DOI: 10.3847/1538-4357/ade678.

- 4 A. Bhattacharjee, **J. Seo**, D. Ryu, and H. Kang, “A simulation study of low-power relativistic jets: Flow dynamics and radio morphology of fr-i jets,” *The Astrophysical Journal*, vol. 976, no. 1, p. 91, Nov. 2024.  DOI: 10.3847/1538-4357/ad83cc.
- 5 **J. Seo**, F. Guo, X. Li, and H. Li, “Proton acceleration in low- β magnetic reconnection with energetic particle feedback,” *The Astrophysical Journal*, vol. 977, no. 2, p. 146, Dec. 2024.  DOI: 10.3847/1538-4357/ad8e64.
- 6 **J. Seo**, H. Kang, and D. Ryu, “Model Spectrum of Ultrahigh-energy Cosmic Rays Accelerated in FR-I Radio Galaxy Jets,” *The Astrophysical Journal*, vol. 962, no. 1, p. 46, Feb. 2024.  DOI: 10.3847/1538-4357/ad182c.
- 7 **J. Seo**, H. Kang, and D. Ryu, “A New Code for Relativistic Hydrodynamics and its Application to FR II Radio Jets,” *IAU Symposium*, vol. 362, pp. 87–93, Jan. 2023.  DOI: 10.1017/S1743921322001314.
- 8 **J. Seo** and D. Ryu, “HOW-MHD: A High-order WENO-based Magnetohydrodynamic Code with a High-order Constrained Transport Algorithm for Astrophysical Applications,” *Astrophysical Journal*, vol. 953, no. 1, 39, p. 39, Aug. 2023.  DOI: 10.3847/1538-4357/acdf4b.
- 9 **J. Seo**, D. Ryu, and H. Kang, “A Simulation Study of Ultra-relativistic Jets. III. Particle Acceleration in FR-II Jets,” *Astrophysical Journal*, vol. 944, no. 2, 199, p. 199, Feb. 2023.  DOI: 10.3847/1538-4357/acb3ba.
- 10 **J. Seo**, H. Kang, and D. Ryu, “A Simulation Study of Ultra-relativistic Jets. II. Structures and Dynamics of FR-II Jets,” *Astrophysical Journal*, vol. 920, no. 2, 144, p. 144, Oct. 2021.  DOI: 10.3847/1538-4357/ac19b4.
- 11 **J. Seo**, H. Kang, D. Ryu, S. Ha, and I. Chattopadhyay, “A Simulation Study of Ultra-relativistic Jets-I. A New Code for Relativistic Hydrodynamics,” *Astrophysical Journal*, vol. 920, no. 2, 143, p. 143, Oct. 2021.  DOI: 10.3847/1538-4357/ac19b3.
- 12 **J. Seo**, H. Kang, and D. Ryu, “The Contribution of Stellar Winds to Cosmic Ray Production,” *Journal of Korean Astronomical Society*, vol. 51, no. 2, pp. 37–48, Apr. 2018.  DOI: 10.5303/JKAS.2018.51.2.37.








Conferences

Invited talks, Seminars, and Colloquia











- | | |
|---------|--|
| 2025.07 |  “A New Computational Method for Energetic Particle Acceleration and Transport with Feedback: Applications to Magnetic Reconnection and Turbulence”.
Midwest Magnetic Fields Workshop 2025 . Madison, WI. |
| 2025.04 |  “Efficient Acceleration and Feedback of Non-thermal Electrons in Solar Flares”.
HSR Team+ Workshop 2025: Energy Release and Conversion in Solar Eruptive Events . NJIT, Newark, NJ. |
| 2024.10 |  “A New Code for Relativistic Hydrodynamics and its Application”.
Geophysical and Astrophysical Fluid Dynamics (GAFD) Seminar Series . UC Santa Cruz, Santa Cruz, CA. |
| 2024.04 |  “Acceleration of Non-Thermal Electrons in Solar Flares”.
CfA Solar Science Meeting . Harvard–Smithsonian Center for Astrophysics, Cambridge, MA.

 “Radio Galaxy Jets as an Origin of Ultra-High Energy Cosmic Rays”.
CfA High Energy Seminar . Harvard–Smithsonian Center for Astrophysics, Cambridge, MA. |




Conferences (continued)

- 2024.03  “Radio Galaxy Jets as an Origin of Ultra-High Energy Cosmic Rays”.
CfA Galaxy Cluster Group Meeting. Harvard–Smithsonian Center for Astrophysics, Cambridge, MA.
- 2023.11  “Particle Acceleration in Astrophysical Phenomena”.
LANL Plasma Group Seminar. Los Alamos National Laboratory, Los Alamos, NM.
- 2023.03  “Radio Galaxies as the Origin of Ultra-High-Energy Cosmic Rays”.
71st GWNR Workshop. Daejeon, South Korea
- 2023.01  “Acceleration of Ultra-High Energy Cosmic Rays at Radio Galaxy Jets”.
The VLBI Group Seminar. Max-Planck institute, Online, Germany
- 2022.09  “A Simulation Study of Radio Galaxy Jets”.
2023 SKA-Korea Workshop. Cheonan, South Korea
- 2021.12  “An introduction to relativistic hydrodynamics simulation and its application”.
66th GWNR Workshop. Pohang, South Korea
- 2021.12  “FR-II radio jets and the acceleration of UHECRs”.
Korea young Astronomers Meeting Colloquium. Online, South Korea


International Conferences

- 2025.06  “Efficient Acceleration and Feedback of Non-thermal Electrons in Solar Flares”.
SHINE Workshop, Charleston, SC, Poster
- 2024.12  “Acceleration and Transport of Nonthermal Electrons in the Solar Flare Region”.
AGU24, Washington, DC, Poster
- 2024.08  “Particle Acceleration in Magnetic Reconnection with Feedback from Energetic Particles”.
AGU24, Washington, DC, Talk
- 2024.07  “Efficient Electron Acceleration in the Solar Flare Region”.
SHINE Workshop, Juneau, AK, Poster
- 2024.07  “Acceleration of Non-Thermal Electrons in Solar Flares”.
HINODE-17/IRIS-15/SPHERE-3 Joint Meeting, Bozeman, MT, Talk
- 2023.07  “Generation of Ultra-High Energy Cosmic Rays at Radio Galaxy Jets”.
ICGAC15, Gyeongju, South Korea, Talk
- 2023.06  “A New WENO Magnetohydrodynamic Code with a High-Order Constrained Transport Scheme”.
2023 ASTRONUM. Pasadena, CA, Poster
- 2022.09  “Particle acceleration at relativistic jets of FR-II radio galaxies”.
2022 IAUGA. Busan, South Korea, Poster
- 2022.06  “Relativistic Hydrodynamic Simulations of Ultra-relativistic Jets in the Intracluster Medium”.
2022 EAS. Valencia, Spain, Poster
- 2021.11  “A New Code for Relativistic Hydrodynamics and its Application to FRII Radio Jets”.
IAU Symposium 362: Computational astrophysics, Online, Talk



Domestic Conferences

- 2023.10  “Radio Galaxies as the Origin of Ultra-High-Energy Cosmic Rays”.
2023 108th KAS Fall Meeting. Jeju, South Korea, Talk
- 2023.04  “A New Magnetohydrodynamic Code with a High-Order Constrained Transport Scheme”.
2023 107th KAS Spring Meeting. Jeonju, South Korea, Talk
- 2022.12  “Particle Acceleration in Radio Galaxy Jets”.
6th CHEA Workshop. Cheonan, South Korea




Conferences (continued)

- 2022.04  “Acceleration of Ultra-high Energy Cosmic Rays at Relativistic Jets”.
2022 105th KAS Spring Meeting. Busan, South Korea, Talk
- 2021.11  “FR-II radio jets and the acceleration of UHECRs”.
5th CHEA Workshop. Busan, South Korea
- 2021.10  “FR-II radio jets and the acceleration of UHECRs”.
2021 104th KAS Fall Meeting. Jeju, South Korea, Talk
- 2021.04  “Structures and Energetics of Flows in Ultra-relativistic Jets”.
2021 103th KAS Spring Meeting. Online, South Korea, Talk
- 2020.10  “A New Code for Relativistic Hydrodynamics”.
2020 102th KAS Fall Meeting. Online, South Korea, Poster
-  “Morphology and Dynamical Properties of Ultra-Relativistic Jets”.
2020 102th KAS Fall Meeting. Online, South Korea, Talk
- 2020.01  “A simulation study of ultra-relativistic jets”.
4th CHEA Workshop. Busan, South Korea
- 2019.01  “The contribution of Stellar Winds to Cosmic Ray Production”.
3rd CHEA Workshop. Gyeongju, South Korea






Collaboration

- 2019 - - - - -  **Center for High Energy Astrophysics (CHEA)**
Ulsan National Institute of Science & Technology, South Korea
- 2022 - - - - -  **Wombat User Group**
University of Minnesota, USA


Skills

- Languages  English, Korean
- Coding  Fortran, Python, C++, IDL, \LaTeX , OpenMP, MPI
- Research  Particle acceleration, Relativistic Jets, Magnetic Reconnection, Collisionless Shock, Astrophysical Turbulence, Galaxy Cluster, Solar Flare, Heliosphere, Hydrodynamics (HD), Relativistic Hydrodynamics (RHD), Magneto-Hydrodynamics (MHD), Monte-Carlo simulation, Simulation code development

High Performance Computing

- 5M CPU Times  LANL HPC, MHD, Particle acceleration Simulations
- 3M CPU Times  NERSC, MHD, Particle acceleration Simulations
- 4M CPU Times  CHEA Cluster, MHD, RHD, Monte-Carlo Simulations
- 2M CPU Times  UNIST Supercomputing Center, RHD Simulations
- 1M CPU Times  PNU Cluster, HD, RHD, Monte-Carlo Simulations

Public Outreach

- 2023.08  “The Theory and Practice of Astronomical Observation”.
Physics Festival for High School students, Ulsan, South Korea

Public Outreach (continued)

- 2023.07 📌 “Relativistic hydrodynamics and a simulation study of ultra-relativistic jets”.
Numerical relativity and gravitational wave summer school, Daejeon, South Korea
- 2023.05 📌 “Path to Becoming an Astrophysicist”.
Gaeun Middle School, Yangsan, South Korea
- 📌 “Path to Becoming an Astrophysicist”.
Muryong High School, Ulsan, South Korea
- 2023.01 📌 “Solving partial differential equations using numerical methods”.
Numerical relativity and gravitational wave winter school, Ulsan, South Korea
- 2022.11 📌 “From a science teacher to an astrophysical researcher”.
PNU Future Education Center, Busan, South Korea
- 2022.10 📌 “What does an astrophysicist do?”.
Gaeun Middle School, Yangsan, South Korea
- 2022.07 📌 “Career Mentoring Program - Astrophysicist”.
PNU Future Education Center, Busan, South Korea
- 2021.12 📌 “The usage of coding in astrophysics”.
Mulgeum High School, Yangsan, South Korea
- 2021.11 📌 “What does an astrophysicist do?”.
Muryong High School, Ulsan, South Korea

Academic services

- 2024.10 - - - - - 📌 **Journal Reviewer**
Astrophysical Journal
- 2024.02 - - - - - 📌 **Workshop Organizer**
LANL Plasma Group Meeting
- 2023.03 - - 2024.04 📌 **Workshop Organizer**
68th-72st Workshop on Gravitational Waves and Numerical Relativity
- 2023.05 - - 2023.11 📌 **Workshop Organizer**
2023 Korea Numerical Astrophysics Group Workshop

Teaching Experience

- 2024.02 - - - - - 📌 **Postbac Mentor**
LANL, NM, United States
- 2020.03 - - 2022.08 📌 **Teaching Assistant**
Pusan National University, South Korea
- 2012.03 - - 2019.08 📌 **High/Middle School Science Teacher**
Gyeongsangnam-do Office of Education, South Korea